

What is claimed is:

1. A sealing device disposed between relatively movable shaft and housing, comprising;

a rigid annular casing provided with a molded elastic rubber like sealing lip disposed in an axial direction thereof, said sealing lip having a frustoconical air-side surface and having a frustoconical oil-side surface; and

a harder portion disposed on said frustoconical air-side surface, hardness of said harder portion being harder than the hardness of said sealing lip.

2. The sealing device according to Claim 1, wherein said harder portion has a helical shape.

3. A process for making a sealing device having a sealing lip having a frustoconical air-side surface and a frustoconical oil-side surface and having a harder helical portion on said air-side surface, hardness of said harder helical portion being harder than the hardness of said sealing lip, said process comprising the steps of;

preparing a foreproduct of said sealing device having a rigid annular casing, a molded elastomeric member bonded to said casing in one body and a sealing lip defined by a frustoconical air-side surface and a frustoconical oil-side surface;

radiating an radiation ray on said frustoconical surface to form said harder portion.

4. The process for making a sealing device according to Claim 3, further comprising a process of placing a mask on said frustoconical air-side surface before radiation, said mask having a helical slit through which said electromagnetic wave passes onto said frustoconical air-side surface to make said helical portion on said frustoconical air-side surface.

5. A sealing device disposed between relatively movable shaft and housing, comprising;

a rigid annular casing provided with a molded rubber like sealing lip disposed in an axial direction thereof, said sealing lip having radially inner portion slidably and sealingly engaging with said shaft;

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a thermoplastic elastomer-based sealing member disposed between said rigid annular casing and said sealing lip, said thermoplastic sealing member having a sealing portion contacting with said shaft to be sealed; and

a harder portion disposed on said sealing portion of said thermoplastic elastomer-based sealing member, said harder portion being harder than the hardness of said thermoplastic elastomer-based sealing member, and said harder portion acting like a pumping rib when there is a relative movement between said sealing device and said shaft.

6. The sealing device according to Claim 5, said thermoplastic elastomer-based sealing member is made from a plain washer-like annular member, inner periphery of which is turned in an axial direction of said sealing device toward said rubber sealing lip, to form a sealing surface slidably and sealingly engaging with said shaft to slide and seal.

7. The sealing device according to Claim 5, wherein said harder portion is formed by irradiation of radiation ray.

8. The sealing device according to Claim 5, wherein said harder portion is made by cross-linking reaction.

9. The sealing device according to Claim 5, wherein said plastic like sealing member is made of a composition comprising fluoro thermoplastic elastomer.

10. A process for making a sealing device disposed between relatively movable shaft and housing, comprising the steps of;

preparing a sheet or a washer-like annular member made of a composition comprising thermoplastic elastomer;

radiating radiation ray on a predetermined surface of said sheet or washer-like annular member; and

molding said sealing device by placing, in a mold, a rigid annular member, said radiated washer-like annular member and a rubber composition so as to set said annular member being placed between and held by said rigid annular casing and said rubber composition, said radiated washer-like annular member being bent in an axial direction thereof so as to place said radiated portion of said annular member to slidably and sealingly engage with the surface of said shaft.

10. A sealing device disposed between relatively movable shaft and housing, comprising;

a rigid annular casing provided with a molded elastic rubber like sealing lip disposed in an axial direction thereof, said sealing lip having a frustoconical air-side surface and having a frustoconical oil-side surface;

a third frustoconical surface disposed between said frustoconical air-side surface and said fructononical oil-side surface; and

a harder helical portion disposed on said third frustovonical surface, hardness of said harder helical portion being harder than the hardness of said sealing portion.